

Combining Operations for Bounds

When combining operations to do with bounds, you need to be careful to make the choice of which bounds to use to reach the correct solution.

Operation	Rule to determine the correct solution
Adding	$Upper\ bound + upper\ bound = upper\ bound$ $Lower\ bound + lower\ bound = lower\ bound$
Subtracting	$Upper\ bound - lower\ bound = upper\ bound$ $Lower\ bound - upper\ bound = lower\ bound$
Multiplying	$Upper\ bound \times upper\ bound = upper\ bound$ $Lower\ bound \times lower\ bound = lower\ bound$
Dividing	$Upper\ bound \div lower\ bound = upper\ bound$ $Lower\ bound \div upper\ bound = lower\ bound$

$$Density, \rho = \frac{mass}{volume}$$

$$Speed = \frac{distance}{Time}$$

$$Range = maximum - minimum$$

$$Volume_{sphere} = \frac{4}{3}\pi r^3$$

Find the error interval for each of the following:

- 1 The mass of a ball is rounded to the nearest 100 grams. The mass of the ball is 700g. The ball has a radius of 12cm rounded to the nearest cm. Calculate the error interval for the density of the ball.
- 2 The length of some pieces of string is rounded to the nearest mm. Find the error interval for the lengths of the pieces of string which are rounded to 42mm, 63mm and 128mm.
- 3 A golfer estimated the distance he hit his ball to the nearest 10 metres. He thought he had hit it 210 metres. It took the ball 8 seconds to travel the distance (to the nearest second). How fast was the ball travelling?
- 4 Jupiter has a mass of 1.898×10^{27} kg rounded to the nearest 10^{24} kg. The diameter of Jupiter is 139, 822 km. What is the density of Jupiter?